

THE ARIZONA WATERSHED PROGRAM

Joseph F. Arnold^{1/}

The Arizona Watershed Program is possibly the most recent of man's numerous and varied attempts to conserve and use water with ever increasing efficiency. In support of many other water management practices, the Program is aimed at recovering a greater percentage of precipitation falling on the State's watersheds. Towards this objective, large scale treatments being tested are aimed at reducing evapo-transpirational losses. Experimental treatments are essentially aimed at converting worthless vegetation types using large quantities of water to more valuable types using smaller quantities of water.

While aimed at increasing water yields, the Arizona Watershed Program is being directed to serve multiple-use objectives by also increasing production of high quality timber, increasing forage and browse for game and livestock, reducing erosion, reducing destructive wildfires and improving conditions for fishing and other forms of recreation.

Guided by recommendations of nationally recognized scientists invited to examine Arizona watersheds in 1956, the program has taken shape in a comparatively short time, through the energetic cooperation of many federal, State and private agencies. Following are some of the treatment practices being tested.

Patch Cutting of High Mountain Mixed Conifer Forests

Clear cutting in patches appears to be the most promising method of harvesting wood products from mixed conifer types, the spruce-fir-aspen-pine forests of high elevations. Clear cutting in patches not only produces wood products from a forest type so far unused in Arizona, but also provides openings for snow and rain to reach the ground and recharge springs and streams. Even though mixed conifer forests embrace but a small area of the State, patch cutting shows promise of providing important increases in water yields. Experimental watersheds on the Apache National Forest will, in the near future, tell us how much water yields can be increased by patch cutting.

When clear cut patches are reseeded, they will provide an additional benefit, namely, more forage and browse for livestock and game.

Thinning of Ponderosa Pine Forests

Open stands of virgin ponderosa pine are the best source of Arizona's high-value commercial saw-log timber. But continued production of high quality timber requires the thinning and pruning of thousands of cut-over acres now choked with dense stands of young trees making little growth.

Aimed at increasing the growth and quality of timber, increasing the production of forage and browse, improving the forests for recreation, and producing more water; the major management objective of the Arizona Watershed

^{1/} Director, State Land Department, State of Arizona, Phoenix, Arizona.

Program is to thin and prune these overstocked stands of pine. A few thousand acres of pine thickets have been thinned on the Coconino National Forest's Wet Beaver Creek pilot watershed project and on the Fort Apache Indian Reservation.

To protect their pine forests against devastating wildfires that usually occur in summer, foresters on the Fort Apache Indian Reservation apply prescribed burning during late fall and early winter to reduce excess forest debris and inflammable fuels.

Effects of these and other forest practices on water yields will be determined in the near future on experimental watersheds now undergoing calibration.

Juniper Removal

Of fourteen and a half million acres of pinon-juniper woodlands in the State, close to a million acres have been cleared by cabling, bull-dozing, hand chopping and burning. Large juniper removal projects, encompassing several thousand acres, occur on several National Forests, Indian reservations and Bureau of Land Management lands.

Although juniper control primarily increases forage and browse for livestock and game, it also reduces erosion. Possibilities that removal of juniper will increase water yields as forage plants replace trees is being closely watched and studied by the U. S. Forest Service, and the U. S. Geological Survey working in cooperation with the Bureau of Indian Affairs.

Conversion of Chaparral Brush

Conversion of dense chaparral brush areas to a more palatable forage cover not only increases grazing values and reduces erosion, but also shows promise of increasing water yields for the Southwest's farms, industries and growing populations.

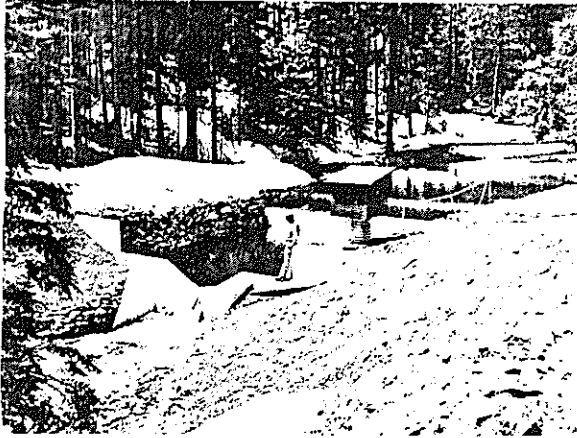
Conversion of brush to grass is another important phase of the Arizona Watershed Program. Using controlled burning, root plowing and chemicals to kill brush species, experimental tests are being made cooperatively by the U.S. Forest Service, Agricultural Research Service, Bureau of Indian Affairs, University of Arizona and the State Game and Fish Department.

Experimental watersheds on the Tonto and Prescott National Forests, now undergoing calibration, will indicate in the near future to what extent brush control can be employed to increase water yields.

Streambank Vegetation

The most extravagant wasters of water are trees lining creeks and dry washes from the top of the watersheds to the downstream dams.

Many agencies are engaged in studying the use of water by salt cedar and possible methods of controlling this species. Another major experiment aimed at determining the wasteful use of water by cottonwood trees and possible methods of control is being conducted by the U. S. Geological Survey in cooperation with the State and the Salt River Valley Water Users Association on



Dense mixed conifer forest and streamflow gaging station. Burro Creek, Apache National Forest.



Patch logging. Sierra Ancha Experimental Forest, Rocky Mountain Forest and Range Experiment Station.



A thicket of ponderosa pine saplings.



A thinned stand of ponderosa pine. Beaver Creek, Coconino National Forest.



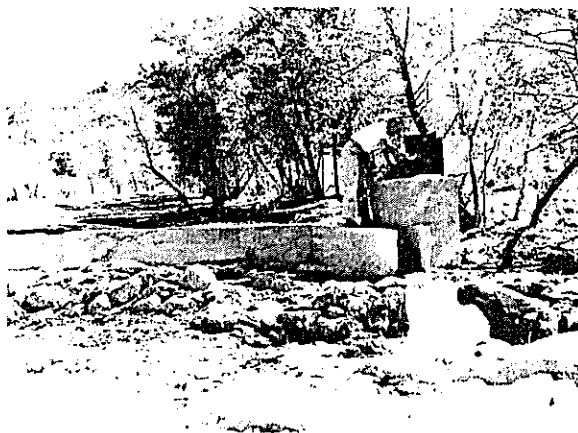
In dense stands, juniper and pinyon crowd out grass and expose the soil to erosion.



Juniper control followed by burning and reseeding increases forage production and reduces erosion. Cedar Mesa, Fort Apache Indian Reservation.



A typical chaparral watershed undergoing streamflow calibration before conversion to a cover of grasses and weeds. Prescott National Forest.



Measuring wasteful use of water by cottonwoods. Cottonwood Wash, U. S. Geological Survey.

Cottonwood Wash, southeast of Kingman. Treatment of stream channel vegetation will be of particular importance if increases in water yields from the higher watershed zones are to reach the dams located at lower elevations.

The Arizona Watershed Program is a cooperative program dependent upon the efforts and talents of many individuals and agencies. In this Program, the Arizona Water Resources Committee, a group of private citizens representing all economic segments of the State, provides the support agencies need in carrying out the watershed tests. The Watershed Management Division of the State Land Department provides the necessary liaison between the various governmental agencies and the Water Resources Committee. But the gratifying rate of progress is largely the result of many individuals in the various agencies working together to achieve the common objective of increasing water yields from the State's watersheds.